NATURE

THURSDAY, NOVEMBER 10, 1870

SCIENCE AND THE WORKING CLASSES

THE spread of scientific instruction among the labouring population is a subject of greater importance than a superficial consideration might allow to it. Our scientific work is at present done almost entirely by our middle class, and mainly by those who have had such an education as is afforded by our universities or technical schools, or by foreign colleges. Not only do we look in this direction almost exclusively for the scientific training of the next generation, but also for the greater part of the work actually done in the field. Were statistics obtainable, it would surprise outsiders to learn how large a proportion of the practical observations in Astronomy, Geology, or Natural History is accomplished by men, the greater number of whose working hours are spent in towns or in some totally uncongenial occupation, and who can only devote a few precious hours stolen from their rest, or their brief summer holiday, to those pursuits which they have done so much to encourage.

This ought not so to be. Every one of these urban lovers of Nature must have returned from his annual retreat in the country with the thought how much more he could do for Science, how much greater scope he would find for the exercise of a keen eye or a cunning hand, if only fortune had so far favoured him that the prime of his life could be spent far from the tumult and dust of cities. And yet we find that, as a rule, those who do live in the country are very slow in making use of their glorious opportunities. The class who spend their whole time in the midst of every varying phase of the phenomena of Nature, have, taken as a whole, contributed little to the advancement of Science. How many a rare fossil, whose determination would have thrown light on some of the occult problems of geology, has been smashed by the careless hammer of the quarryman! How many a phenomenon of animal or vegetable life, the recording of which might have forestalled the discoveries of a Darwin or a Wallace by half a century, has remained unnoticed by the field-labourer before whose vacant gaze alone it passed! How many a strange monster or exquisite unknown form of life, for the possession of which all the museums of Europe would have eagerly competed, has been passed with merely an exclamation of awe or wonder by the untutored fisherman or sailor! The wealth of scientific knowledge which has in this manner been lost is incalculable. Now and then a Hugh Miller rises from the ranks to the command of a brigade in Science; now and then a George Stephenson, invincible from the feeling of conscious power, fights against difficulties of which those in the middle class can have but a faint conception, and comes to the fore by the force of inherent genius; but these are but a few solitary landmarks in the midst of the dead level of the intellects of our rural population.

The cause of this failure is not far to seek. It is simply want of education,—education, in the first place, of the powers of observation, and in the second place of the reasoning faculties, by the use of which alone the observations can be utilised and made to subserve the ends of Science. Everyone who has had the opportunity must have been struck with the dormant condition of the habist of observation of our agricultural population. An adaptation of purpose to end, or a deviation from the ordinary course of the laws of Nature, which would at once strike the educated eye, does not for a moment arrest their attention. Even of occurrences which pass daily before their eyes they are profoundly ignorant. We were once asked by a very intelligent labourer, whose occupation took him abroad frequently by night, if we could explain how it was that the moon shifted her place among the stars so much in the day time, while she remained stationary all night! The first thing to do with the working man is to teach him how to make use of his eyes. And in this first elementary lesson we are afraid our teachers of Science have hitherto lamentably failed. The error of "popular" scientific lectures, of evenings with working men at mechanics' institutes, is that which is so commonly attributed to clergymen, that of speaking over the heads of their audience. It does not really profit your Hodge or Styles to be discoursed to for an hour about the wonders of astronomy, the uninterrupted chain of organic beings from the Amœba to the Elephant, or the grandeur of the uniformitarian theory of geology. Take him out on a starry night and let him look through a telescope, and see for himself that Saturn is a round orb suspended in the air, with its marvellous rings and its attendant satellites; take him where with his own hands he may exhume a shark's tooth from a chalk-pit, and show him how this absolutely proves that the spot on which he stands was once fathoms deep beneath the ocean; put a flower in his hand, and point out the structure and the function of every organ, and you will at least have made a beginning. You cannot be too simple or practical. Treated in this way, we believe that every science-teacher who has tried the experiment will testify to the eagerness of the working man to increase his store of knowledge. In the case of those classes of the labouring population who live in towns, the only substitute is to take them to the Museums or Collections of Natural History, which are the best representatives of Nature herself. For our country gentlemen and tradesmen, the Naturalists' Field Clubs, which now flourish in so many counties, are doing a good work: something of a similar kind is wanted for the less educated class of the population.

But when the eye has been trained to observe, the whole work of education has by no means been accomplished. It is the portion of the work on which there is most need to insist at the present time, because it has hitherto been almost entirely neglected. The system pursued till recently in our Universities and public schools was based on a high cultivation of the reasoning faculties, to the almost entire exclusion of any recognition of the perceptive powers. There may be a danger now of running into the other extreme, and already we hear some zealous devotees of Natural Science exclaim against book knowledge, as if it were opposed to a practical scientific training. There cannot be a greater mistake. Unless a man thinks to live the life of a recluse, and to profit nothing by the labours of others in the same field, the greater part of his knowledge must always be derived from books. What we insist on is that the learner must be taught *first* to use his own eyes, before he has recourse to the experience of others. No man can be considered to be highly edu-

© 1870 Nature Publishing Group

cated who does not possess the power of bringing his perceptive faculties to play on the phenomena that surround him, and also of exercising his reasoning powers to systematise his observations, and to compare them with those of others who have preceded him. The surest way of cultivating the Perception is by the severe study of some branch of Natural Science; the Reason is to be trained in the lecture-room and the study. Nature does not proceed on the principle of setting one of her gifts at variance with another; and so far from one of these sets of faculties being opposed to the other, neither can be cultivated to the full extent of the mental powers without the assistance of the other. No nation has distinguished itself by producing a greater number of keen and accurate observers of Nature than the Scotch, and none has set a higher value on the education that is derived from books. In the scientific education of the agricultural population of England, it will be found that the long disuse for generations of the reasoning powers is the greatest difficulty to be overcome. Although we do meet here and there with those who are more or less accurate observers of Nature, it is extremely rare to find one who has any power of forming a connected train of reasoning as the result of his observations.

We need but look around us on the events passing before our eyes on the Continent of Europe, to recognise the manner in which Education is proclaiming herself victorious along the whole line. As a nation, we are slow to learn. But that nation must indeed be both deaf and blind, which does not at the present time see the necessity of straining every nerve to redeem itself from the disgrace of ignorance. With our working classes taught to exercise those faculties which they all possess, but which so few know how to use, and thus trained to form the strength of the nation in all fresh advancements in Science and the Arts, England would quickly distance all competitors, and assume that position which it would now seem younger rivals are likely to snatch from her grasp.

HUXLEY'S LAY SERMONS

Lay Sermons, Addresses, and Reviews. By Thomas Henry Huxley, LL.D., F.R.S. (Macmillan and Co., 1870.)

IN this volume Professor Huxley has presented to the public a miscellaneous collection of essays, some didactic, some controversial, some addressed to a general audience, some to a special one, and composed at various times during a number of years extending from 1854 to within the last few months.

The subjects of which the Professor treats are as various as the occasions for which his papers were written and the audiences which he addresses, and, as may be easily believed, his essays are of very unequal value. But one great element of value they all possess in common, and that is, the thorough-going boldness, and honesty, and out-spokenness with which they deal with all subjects alike. This is no small merit in any writer, and it is an especially great one in a man occupying the position which is held by Professor Huxley. It is a remarkable condition of English society at the present time that a man who combines real scientific eminence with great general ability and special oratorical power, as Professor Huxley does, is made, with or without any consent of his own, into a kind of popular oracle. Like an oracle he is expected to have a response ready for any imaginable query, and like an oracle too he must find himself not unfrequently under special and strong temptation to "prophesy smooth things." Yet Mr. Huxley does not prophesy smooth things; on the contrary, he does not hesitate to put the most unpopular propositions in the plainest possible language when he sees that it is right to do so; and to say that a man—and that man a public teacher—lies under special temptation, and that he resists that temptation, is to say at once that his teaching must be worth listening to, and that even where we cannot accept his doctrines, we may still listen to them with advantage and gain instruction from them.

With one exception, the papers in this volume may be classed under three heads, viz.: Educational Essays, either theoretical or practical, which include Nos. 1, 3, 4, 5, 6, and 9: Scientific Controversy, consisting of Nos. 12 and 13, on the Origin of Species; and also 7, 8, and 14, of which the first is the famous "Essay on the Physical Basis of Life," and the other two are replies to the attacks made upon the former: Finally, Presidential Addresses to the Geological Society, Nos. 10 and 11, of which the latter might fairly come under our second heading, consisting as it does of a very able reply to Sir W. Thomson's strictures upon modern geology. The essay which will not come into any of these divisions is the shortest in the book; viz. that on "Emancipation, Black and White." We must however devote some space to it, since it appears to us to be almost the best reasoned and most temperate view of what its author calls the "irrepressible woman question" which we have yet seen, although we are not prepared to accept the author's conclusions without reserve. In this essay Mr. Huxley's allegiance to the facts of science comes into uncomfortable collision with his allegiance to the traditions of party. He comes before us in the character of an advanced Liberal, but he cannot forget that he is, before all things, a biologist; and the consequence very naturally is, that although he is prepared to support a policy of emancipation—apparently upon the general principle that *all* government is a mistake—yet he is compelled to admit that the arguments of *extreme* emancipationists are "to a great extent nonsensical." We are confident that this question is one which must be ultimately settled mainly upon physiological grounds, and it is just because the conventions of society very rightly do not admit of the full and fair discussion of those grounds before mixed audiences, that the extreme emancipationists have been enabled to obtain for their theory the amount of currency which has lately fallen to its lot. In the present instance, Mr. Huxley appears to have followed out his physiological argument with characteristic fairness *to a certain point*, and consequently sees that after all due emancipation, "Nature's old salique law will not be repealed, no change of dynasty will be effected;" and again, that "so long as potential motherhood is her lot, woman will be found to be fearfully weighted in the race of life." But why should Mr. Huxley halt at this admission? Why does not his Darwinian logic carry him on to its legitimate and necessary consequence? According to the law

© 1870 Nature Publishing Group